USE OF INTEGRATED CIRCUITS IN COMMERCIAL AVIATION

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USE OF ICs IN AIRCRAFT SYSTEMS

- Used in Flight Critical Systems
  - » Flight Controls
  - » Air Data Inertial Reference Systems
  - » Engine Control Systems, etc.
- Today's Fly-By-Wire - Few/No Hardwired Back-up Systems
- Redundant Systems Frequently Use Similar/Same Hardware

ISSUES/CONCERNS

- Design
  - » Use of ASICs to Avoid Developing Software Which is Regulated by RTCA/DO-178B
  - » Programming Languages

ISSUES/CONCERNS (cont.)

- Tools
  - » ICs Developed Using Computer-Based Tool Suites Which Are Not Required to be Qualified
  - » Immature Tool Suites

ISSUES/CONCERNS (cont.)

- Test/Verification
  - » Complexity of Device Hinders Simulation of Functionality
  - » Failures Modes Not Readily Identifiable
  - » Need to Analyze/Test Each Step in the Development Process

ISSUES/CONCERNS (cont.)

- Reliability
  - » No Guarantee of Error-Free Designs nor Error-Free Silicon
  - » As Complexity Increases so does the Risk of Latent Faults
  - » Failures can go Undetected

REGULATIONS/GUIDANCE

- The FAA has no Regulations/Guidelines which Address Complex Hardware
- Generic Issue Paper for Application Specific Integrated Circuits

REGULATORY ACTIVITIES

- RTCA, Inc. Special Committee 180 formed in late 1993 to Address ASICs
- Terms of Reference Expanded to Include Complex Hardware
- Committee consists of Industry and Government both National and International

REGULATORY ACTIVITIES (cont.)

- Committee Members Backgrounds are Mainly Hardware Engineers and Managers. No Representation by Chip Manufacturers.

- Still Struggling with Basic Concerns such as Tool Qualification, Reliability, Test/Verification (When/What/How much is enough?)

THE FUTURE

- **Reality**
  - » Manufacturers do not want to Spend the Resources Necessary to Satisfy such a Small Market
  - » ICs will Continue to Increase in Use
  - » ICs will Continue to Increase in Complexity

THE FUTURE (cont.)

- Idealistically
  - » Design Tools are Qualified
  - » Design Tools can Deal with the Complexity of the Design
  - » Lifecycle Processes are well Understood and in Place to Ensure Repeatability, Reliability, Etc.